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ABSTRACTS

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is identified by the fossils from limestone. Some people think the ophiolite suite belongs to Middle-Devonian. Some people believed that the ophiolite suite is of Upper Silurian-Lower Devonian, however, we think that the ophiolite suite is Early Carboniferous in age, namely, Tournaisian-Visean. In the meantime, four Radiolarian assemblages have been divided, namely, the *Triaenosphaera palimbola, Entactinia vulgaris, Belowea cf. variabilis* and *Archocyrtium sp.* assemblages. The fauna may be correlated with that from the Early Carboniferous of Germany and North America. Because there is the lack of genus of Allbaillella, the name of assemblage is different. Based on these analyses, the sequence of Radiolarian-bearing is compared with that established by Mr. Andreas Braun from Germany. The elements of assemblage zone and appearance sequences of these elements in the section are quite similar, even though those two assemblage zones are named by the different Radiolarian. Therefore the age of the assemblage zone is the Early Carboniferous. In addition, these elements widely dispread in Lower Carboniferous in the North America and the Southern China.

The wall rock of the four radiolarian assemblages is red purple and thin-bed siliceous rock. It is concentrated in ferric iron. Eu-hedral form and ana-hedral form grand magnetite can be seen. They represent a kind of environment of hydra-thermal cascade. The fossils of Radiolarian fauna are of small and fine thin shell decoration as well as symbiotic life of Spongespine and Conodonts. The conodont assemblages belong to Nandan type. Based on these analyses, the environment is suggested to be of low latitude, warm water and normal sanity. According to the sediments, Radiolarian, symbiotics and petrochemistry, we think that the ophiolite reflects low-speed expanding original ocean on the basis of the land-shell with region scale. The above researches provide the basic information for further study of the evolution history of South Tianshan.

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THE RECORD OF DINOSAUR EXTINCTION IN THE SOUTH-CENTRAL PYRENEES

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The south-central Pyrenees (Spain) provide one of the most complete fossil records of the last 8.5 Ma of the dinosaur succession. Dinosaur remains such as bones, teeth, footprints, eggs and eggshell fragments are common in the Upper Cretaceous Aren and lower part of Tremp formations. The Aren Fm consists of shales, sandstones, and calcarenites deposited in a deltaic and shoreface environment. The laterally equivalent lower part of the Tremp Fm consists of red beds deposited in a coastal plain environment. These rocks have a maximum thickness of some 2,500 m and are divided into five depositional sequences that have been mainly correlated by means of rudist-bearing horizons and chemostratigraphy, and dated by means of planktonic foraminifera and magnetostratigraphy from late Campanian to Maastrichtian (Ardèvol *et al.*, 2000; Vicens *et al.*, in press).

Some 147 dinosaur sites have been recognized in these formations: 100 sites contain mainly eggs or eggshell fragments, 36 contain bones and teeth, and 11 show footprints (López-Martínez, in press). 117 of these sites belong to the sequence 2 of latest Campanian age, 15 sites are located in the sequence 3 of early-late Maastrichtian age, and 11 in the latest Maastrichtian sequence 4. Four dinosaur sites are located in the sequence 5 that contains the K/T boundary is situated below a low delta 13C anomaly at the upper part of chron c29r, in a 1-3 m interval without fossils (López-Martínez *et al.*, 1998). The study of the fossil content and distribution of the sites have led to the following conclusions:

(1) There is a sudden decrease in dinosaur fossil localities around the Campanian/Maastrichtian boundary (according Gradstein *et al.*, 1995). In the sequence 2 there is a frequency of 50 sites/Ma, while the sequences 3-4 show only five sites/Ma. This uneven distribution is highly significant (the Chi-square probability is as low as 2.48^{-15}). No depositional or taphonomic changes seem to be related to this rapid decrease.

(2) There is a gradual change in the taxonomic composition from lower to upper Maastrichtian. Sauropod-rich assemblages in sequence 2 are replaced by hadrosaur-dominated assemblages in sequence 4. Titanosaurs, hadrosaurs and theropods are present in the entire succession, however ankylosaurs and the ornithopod *Rhabdodon* have not yet been found in sequences 4-5.

(3) Each sequence shows about 8-10 dinosaur taxa, hence dinosaur diversity does apparently not change in the succession until their sudden demise at or close to the K/T boundary.

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TABULATE CORALS OF CENTRAL TIMAN (NORTH-EAST EUROPEAN RUSSIA)

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